Chesapeake Bay TMDL Loadings Errata Sheet
Correct Formula To Use and Example Calculations

The 2014 Industrial Stormwater General Permit (VAR05) requires permittees in the Chesapeake Bay watershed to calculate the facility specific loadings for total suspended solids (TSS), total nitrogen (TN) and total phosphorus (TP) (see permit Part I B 7 b (3) [Special Condition #7]). Nutrient and sediment data are to be collected for the first four (4) permit monitoring periods (i.e., every six months for the first two years of permit coverage). The facility-wide average data for each pollutant (i.e., average of all samples for each pollutant from all the outfalls at the facility) are to be used in the calculation.

The correct formula that should be used to calculate the loading values is:

$L = 0.226 \times R \times C$ *Equation (1)*

where:

L = the Pollutant of Concern (POC) loading value (lb/acre/year)

C = the POC average concentration of all facility samples (mg/L)

*[**NOTE**: for facilities with more than one outfall, this should be a weighted average of the concentration values based on the area of each outfall - - see the example calculation #2 below]*

0.226 = unit conversion factor

R = annual runoff (in/yr), calculated as: $R = P \times P_j \times R_v$

where:

P = annual rainfall (in/yr) [*use the Virginia annual average of 44.3 in/yr, or site specific annual rainfall for your area of the State, or another Board approved method*]

P_j = the fraction of annual events that produce runoff (usually 0.9)

R_v = the runoff coefficient, which can be expressed as: $R_v = 0.05 + (0.9 \times I_a)$

I_a = the impervious fraction [*the ratio of facility impervious area to the total facility area*]

or, $I_a = AREA_{IMPERVIOUS} / AREA_{TOTAL}$

Substituting in Equation (1):

$L = 0.226 \times P \times P_j \times (0.05 + (0.9 \times I_a)) \times C$ *Equation (2)*

<u>Example Calculation # 1</u> (assumes the permit coverage begins 7/1/2014):

The facility has one (1) storm water outfall.

The permittee collects four (4) grab samples for total phosphorus (TP), total nitrogen (TN), and total suspended solids (TSS) (with the last samples collected by 6/30/2016).

Calculate the loading (L) in lb/acre/year using *Equation (2)* above and:

P = 44.3 in/yr,
P_j = 0.9,
I_a = 0.80, and
C (TP) = 0.35 mg/L total phosphorus (average of all samples from the outfall)
C (TN) = 2.0 mg/L total nitrogen (average of all samples from the outfall)
C (TSS) = 70.0 mg/L total suspended solids (average of all samples from the outfall)

<u>Calculated Loadings for the Facility</u>	<u>Chesapeake Bay TMDL Loading Values</u>
L = 2.43 lb/ac/yr TP	1.5 lb/ac/yr TP
13.88 lb/ac/yr TN	12.3 lb/ac/yr TN
485.7 lb/ac/yr TSS	440 lb/ac/yr TSS

In the example above, the facility calculated TP, TN, and TSS loading values (L) are above the Chesapeake Bay TMDL Loading Values, so the permittee would be required to submit a Chesapeake Bay TMDL Action Plan within 90 days from the end of the second year's monitoring period (September 28, 2016). See the permit Part I B 7 b (3) (c) for the TMDL Action Plan requirements, and Part I B 7 b (3) (d) for the Action Plan Annual Reports that are due June 30th of each year.

Example Calculation # 2 (assumes the permit coverage begins 7/1/2014):

The facility has three (3) storm water outfalls.

For each outfall, the permittee collects four (4) grab samples for total phosphorus (TP), total nitrogen (TN), and total suspended solids (TSS) (with the last samples collected by 6/30/2016).

Calculate the loading (L) in lb/acre/year using *Equation (2)* above and:

P = 44.3 in/yr,
P_j = 0.9,
I_a = 0.80, and

Outfall #1: area = 1.7 acres
C1 (TP) = 0.35 mg/L total phosphorus (average of all samples from the outfall)
C1 (TN) = 2.4 mg/L total nitrogen (average of all samples from the outfall)
C1 (TSS) = 100.0 mg/L total suspended solids (average of all samples from the outfall)

Outfall #2: area = 3.5 acres
C2 (TP) = 0.13 mg/L total phosphorus (average of all samples from the outfall)
C2 (TN) = 2.0 mg/L total nitrogen (average of all samples from the outfall)
C2 (TSS) = 65.0 mg/L total suspended solids (average of all samples from the outfall)

Outfall # 3: area = 6.2 acres
C3 (TP) = 0.22 mg/L total phosphorus (average of all samples from the outfall)
C3 (TN) = 1.4 mg/L total nitrogen (average of all samples from the outfall)
C3 (TSS) = 50.0 mg/L total suspended solids (average of all samples from the outfall)

Total Facility Area = 11.4 acres

Facility-Wide Concentration Calculations (Weighted Average):

$$C(TP) = \frac{(0.35 \times 1.7) + (0.13 \times 3.5) + (0.22 \times 6.2)}{11.4} = 0.212 \text{ mg/L total phosphorus}$$

$$C(TN) = \frac{(2.4 \times 1.7) + (2.0 \times 3.5) + (1.4 \times 6.2)}{11.4} = 1.733 \text{ mg/L total nitrogen}$$

$$C(TSS) = \frac{(100 \times 1.7) + (65 \times 3.5) + (50 \times 6.2)}{11.4} = 62.1 \text{ mg/L total suspended solids}$$

Calculated Loadings for the Facility	Chesapeake Bay TMDL Loading Values
L = 1.47 lb/ac/yr TP	1.5 lb/ac/yr TP
12.03 lb/ac/yr TN	12.3 lb/ac/yr TN
430.6 lb/ac/yr TSS	440 lb/ac/yr TSS

In the example above, the facility calculated TP, TN, and TSS loading values (L) are below the Chesapeake Bay TMDL Loading Values, so the permittee would **NOT** be required to submit a Chesapeake Bay TMDL Action Plan. No further action is needed by the permittee.